A long-range reservoir operating plan study.

Mississippi River Headwaters
Reservoir Operating Plan Evaluation (ROPE)

# Shared Vision Planning for the Mississippi Headwaters ROPE Study

Terry Birkenstock and Steve Clark - St. Paul District

Hal Cardwell and Mark Lorie - IWR

US Army Corps of Engineers
St. Paul District

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

US Army Corps of Engineers®
St. Paul District

# Presentation Overview

- General what, where, who, and why of ROPE
- Shared Vision Planning
  - What is it?
  - Why was it appropriate for ROPE?
  - How it has been applied to ROPE?
  - How it has guided the development of ROPE analytical tools?
- Lessons Learned
- Take-away Points

US Army Corps of Engineers®
St. Paul District

# What is the ROPE Study?

**R**eservoir **O**perating **P**lan **E**valuation

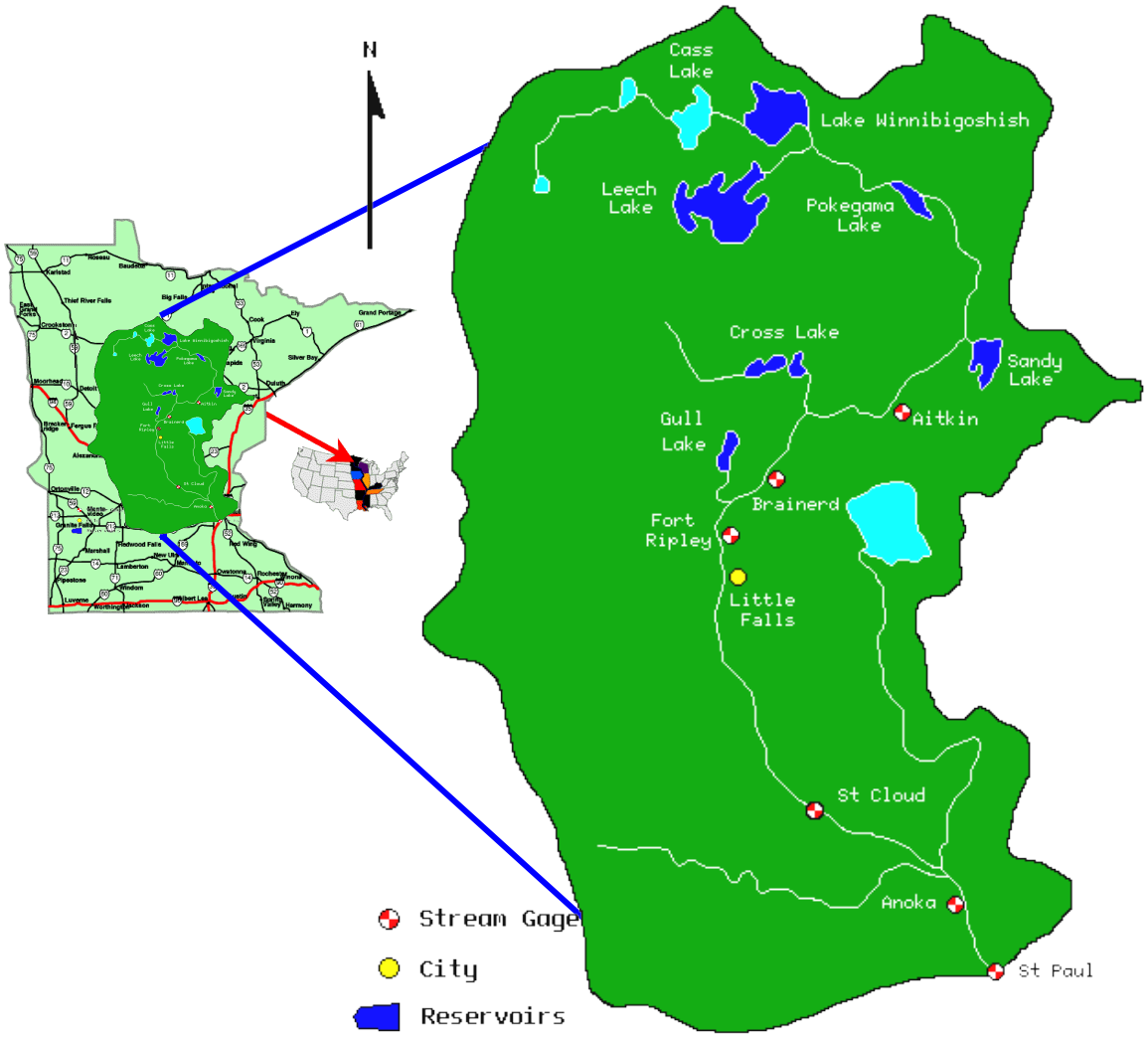
- Process used to assess the current and potential future operating plans of reservoirs.

## Primary Output:

- Operating plan that balances a full range of regional interests to benefit natural, economic and cultural resources.

US Army Corps of Engineers®
St. Paul District

# ROPE Study Area




**Large Study Area:**

**7 inter-connected Federal reservoirs (6 COE, 1 USFS).**

**415 square miles of affected lake surface.**

**484 miles of**

US Army Corps of Engineers®
St. Paul District

# Corps Headwaters Reservoirs Project Purposes

- Navigation
- Flood Control/Reduction
- Recreation
- Water Quality & Water Supply
- Fish and Wildlife
- Tribal Trust

US Army Corps of Engineers®
St. Paul District

# Key Aspects of Operations

To support the authorized Federal purposes, the water control plans for the Corps reservoirs have the following operational provisions:

1. Seasonal water level targets
2. Minimum river flows during low-flow periods
3. Fall/winter drawdown of lake levels
4. Flooding considerations (in lake & downstream)
5. Environmental and Tribal trust considerations

US Army Corps of Engineers®
St. Paul District

# Why is a ROPE Study Needed?

- The current operating plan was last revised about 40 years ago.
- Conditions in the study area have changed with increased development and recreation pressures.
- Current operations focus on flood damage reduction and recreation and do not fully incorporate environmental or tribal considerations.

US Army Corps of Engineers®
St. Paul District

# Federal ROPE Study Participation

- Corps of Engineers
  - Lead Agency
  - 85% of Study Costs
- US Forest Service
  - Cooperating Agency
  - 15% of Study Costs
- IWR and HEC – technical support

US Army Corps of Engineers®
St. Paul District

# Non-Federal ROPE Study Participation

- Leech Lake and Mille Lacs Tribes
- Minnesota Department of Natural Resources
- Minnesota Pollution Control Agency
- The Nature Conservancy
- Hydropower Facilities
- Municipalities
- Lake Associations/Groups
- General Public

US Army Corps of Engineers®
St. Paul District

# Requirements for ROPE Study Success:

- Full Stakeholder Involvement needed to understand and balance numerous competing interests.
- A transparent planning process to build consensus among the different interest groups with an emphasis on collaboration and education.
- Incorporation of the NEPA process for the preparation of an EIS.

US Army Corps of Engineers®
St. Paul District

# ROPE Progress

| | |
|---|---|
| Study Initiation | 2002 |
| Release of Notice of Intent for EIS | 2003 |
| Model Development | 2003 - Present |
| Alternative Development | Present |
| Plan Selection and Release of Report | Fall 2006 |
| Begin Operating Under New Plan | Spring 2007 |

US Army Corps of Engineers®
St. Paul District

# Shared Vision Planning

***"Whiskey is for drinking. Water is for fighting over." – Mark Twain***

- IWR developed the Shared Vision Planning Process to reduce conflict in water resource management and to foster the development of acceptable water resource plans.
- It was recognized early in the ROPE Study that such a process would be required to develop an acceptable operating plan for the Headwaters reservoirs.

US Army Corps of Engineers®
St. Paul District

# Shared Vision Planning Definition

"Shared vision planning is a planning process that incorporates collaboration, sound technical analysis, and tried and true planning principles into a practical forum in which resource management decisions are made. The approach integrates in a unique way three components of a typical planning study: 1) The Corps Planning Process, 2) Public Participation, and 3) Technical Systems Model."

(IWR, http://www.iwr.usace.army.mil/iwr/svp/svppage.htm)

US Army Corps of Engineers®
St. Paul District

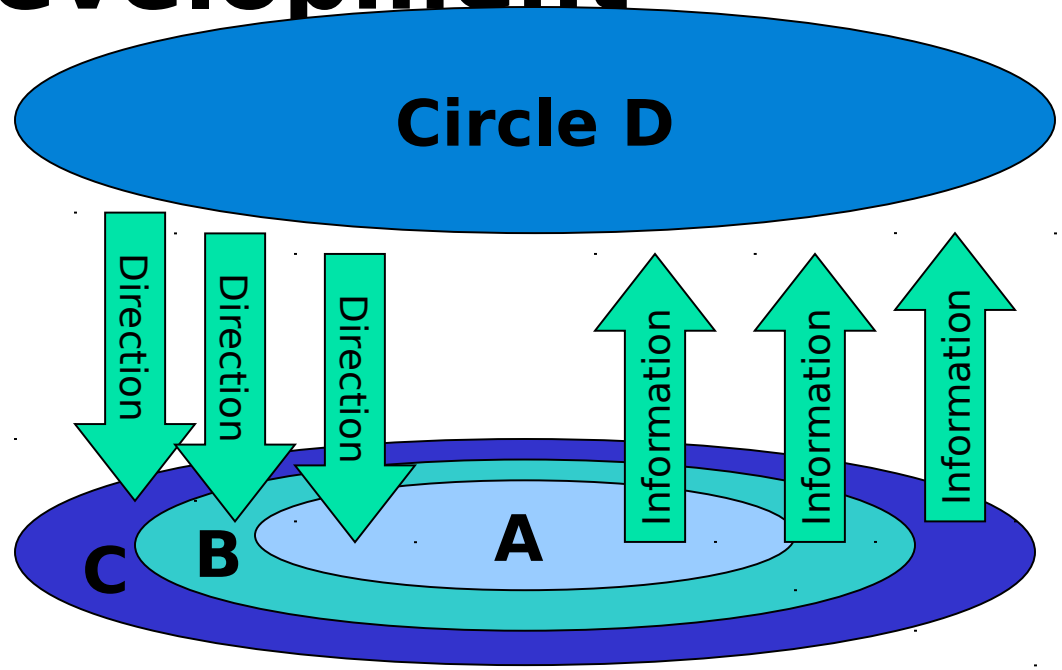
# Shared Vision Planning

- The key to the SVP process is **fully incorporating stakeholder involvement in the development of** flexible, transparent, and easy-to-use **models**.
- This helps reduce the perception by stakeholders that study models are “black boxes” and helps create stakeholder ownership of these models.

US Army Corps of Engineers®
St. Paul District

# SVP Structured Collaboration for Model Development

- "Circles of Influence" concept relies on team building.
- Concentric circles link representatives with differing levels of personal involvement.




**Circle A – Model Building team**

**Circle B – Model Users, Validators**

**Circle C – All Interested Parties**

**Circle D – Decision Makers**

US Army Corps of Engineers®
St. Paul District

# Shared Vision Planning Modeling Software

- Object-oriented modeling software based on the graphical manipulation of objects or “icons” that have specific characteristics can better meet these requirements than traditional procedural coding such as in FORTRAN.
- STELLA (High Performance Systems, Inc) is the software package used to build the ROPE simulation model.

US Army Corps of Engineers®
St. Paul District

# Primary ROPE Analytical Models

- **STELLA model**: To simulate and evaluate alternative water release plans.
  - Was to be available to the general public via the project website
- **HEC-PRM model**: HEC optimization model to assist in alternative operating plan development.
  - Will help bolster the alternative development process within SVP context

US Army Corps of Engineers®
St. Paul District

# Secondary ROPE Analytical Models

- **Decision model** (a model output interface): to help summarize PRM and STELLA output to aid in comparing and selecting plans
- **Resource models or "overlays"**: for impact analysis built into the PRM and STELLA models.

Flood damages

Tribal

Archeological

Hydropower

Environmental

Erosion

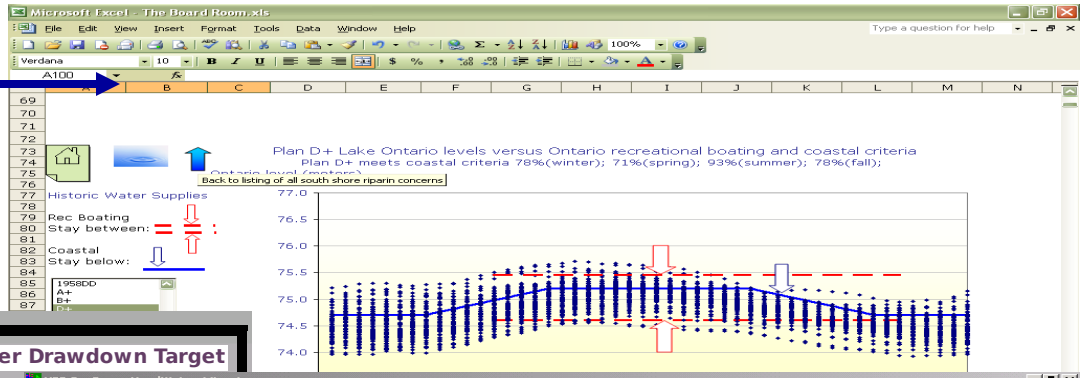
Water supply

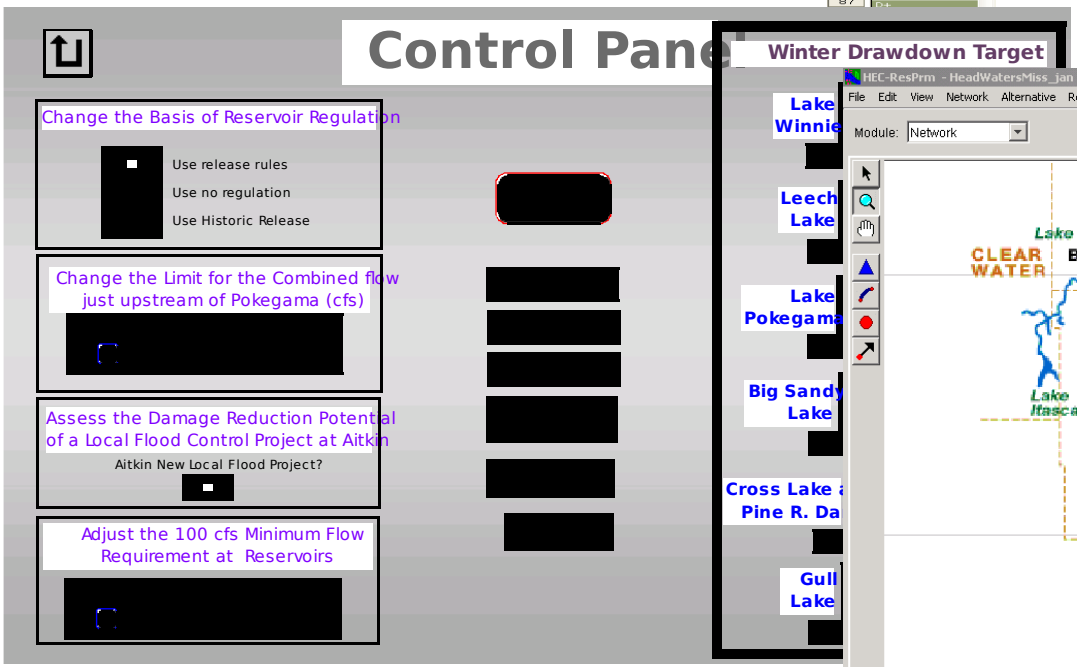
Recreation

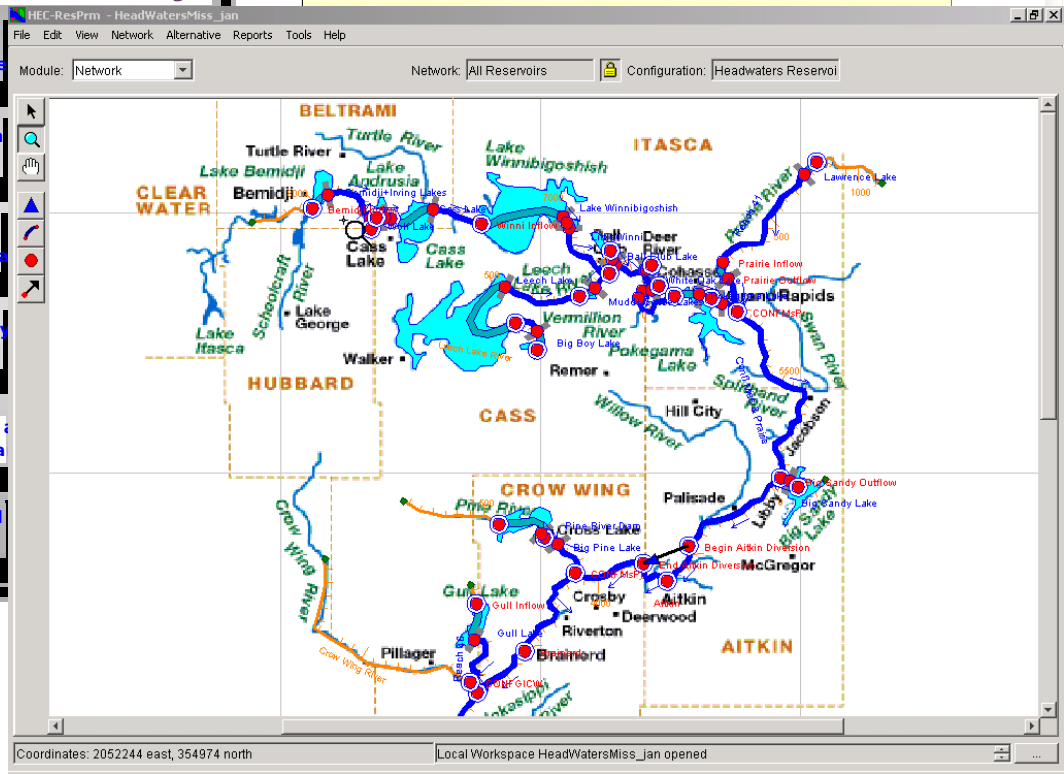
# Linked Stella, PRM and Decision Models

US Army Corps of Engineers®
St. Paul District

Evaluation using dynamic Excel spreadsheet for graphical display of simulation results


Microsoft Excel - The Board Room.xls
Plan D+ Lake Ontario levels versus Ontario recreational boating and coastal criteria
Plan D+ meets coastal criteria 78%(winter); 71%(spring); 93%(summer); 78%(fall);
Historic Water Supplies
Rec Boating
Stay between:
Coastal
Stay below:


Control Pane
Change the Basis of Reservoir Regulation
Use release rules
Use no regulation
Use Historic Release
Change the Limit for the Combined flow just upstream of Pokegama (cfs)
Assess the Damage Reduction Potential of a Local Flood Control Project at Aitkin
Aitkin New Local Flood Project?
Adjust the 100 cfs Minimum Flow Requirement at Reservoirs
Winter Drawdown Target
Lake Winnie
Leech Lake
Lake Pokegama
Big Sandy Lake
Cross Lake a Pine R. Da
Gull Lake



US Army Corps of Engineers®
St. Paul District

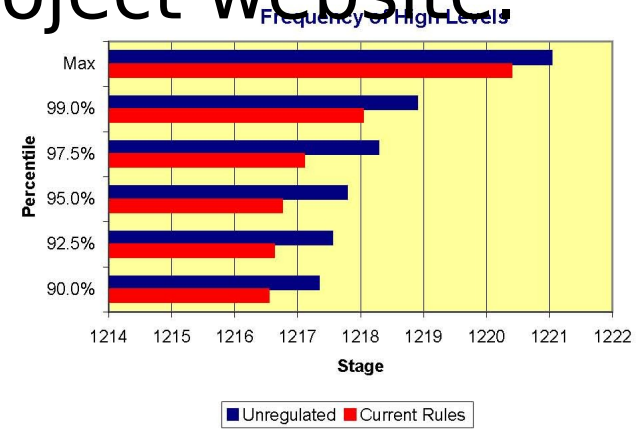
# Deviations from the Intended SVP Process

- Early in the study it was intended that the STELLA model would be available on the project website for manipulation by the public to answer what-if questions.
- The complexity of the reservoir system and the numerous study objectives resulted in a model that cannot be easily operated by ROPE stakeholders.
- The STELLA model will be available during public meetings to answer what-if questions.

US Army Corps of Engineers®
St. Paul District

# Deviations from the Intended SVP Process

The Decision model was developed to present the results from the STELLA model and will be available on the project website.

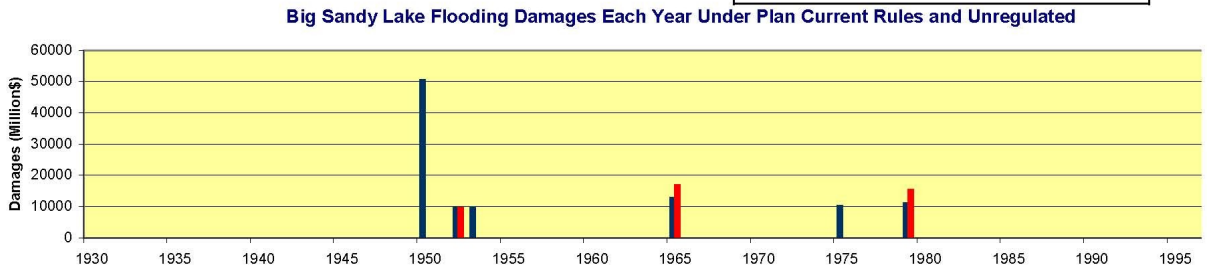



**Statistics for Big Sandy Lake Flooding**

| | Unregulated | Current Rules |
|---|---|---|
| Number of Floods | 12 | 5 |
| Damages Per Event | $8,682 | $8,376 |
| Avg Annual Damages | $1,432 | $576 |
| Structures Damaged | 10 | 5 |
| Avg Annual Ag Damages | $0 | $0 |
| Worst Flood | $33,448 | $13,947 |
| Highest Stage | 1221.03 | 1220.39 |

Choose a Plan to Graph
Unregulated

Choose a Location to Graph
Big Sandy Lake



US Army Corps of Engineers®
St. Paul District

# SVP Process Contributions to the ROPE

- SVP Provided a framework for stakeholder involvement to improve model development.
- Greater understanding of the potential study impacts and the issues to be addressed.
- Stakeholder acceptance of the ability of the models to answer what-if questions.
- **Stakeholder assurance that their interest is represented in the model and the study process.**
- Improved likelihood of an acceptable study outcome……but only time will tell.

US Army Corps of Engineers®
St. Paul District

# Lessons Learned

- Complex projects must be scoped carefully, especially when innovative techniques are being used.
  - The complexity of the reservoir system being modeled for the ROPE hindered the transparency of the models – still may be perceived as a black box by the public.
  - The complexity of the reservoir system and the use of a new modeling method (STELLA) made it difficult to estimate project costs and schedule.

US Army Corps of Engineers®
St. Paul District

# Lessons Learned

- When involving all stakeholders in numerous study groups, a plan should be developed to clearly structure the group participation.
  - Clear criteria should be devised to direct participation in the numerous involvement groups.
  - Such criteria would ensure a clear understanding of roles and help ensure fairness of involvement in the process.

US Army Corps of Engineers®
St. Paul District

# Take-Away Points

- SVP integrates the Corps planning process and full stakeholder involvement with the use of transparent models.
- SVP improves communication between the study team and the stakeholders.
- SVP helps assure stakeholders that the models are technically sound and that their interests have been incorporated in the study process - builds trust.